



Enrichment of high ammonia tolerant methanogenic culture

Fotidis, Ioannis; Karakashev, Dimitar Borisov; Proietti, Nicolas; Angelidaki, Irini

Publication date:
2012

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Fotidis, I., Karakashev, D. B., Proietti, N., & Angelidaki, I. (2012). *Enrichment of high ammonia tolerant methanogenic culture*. Abstract from Nordic Biogas Conference 2012, Copenhagen, Denmark.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Enrichment of high ammonia tolerant methanogenic culture

Ioannis Fotidis¹, Dimitar Karakashev², Nicolas Proietti³ and Irini Angelidaki⁴

Department of Environmental Engineering, Technical University of Denmark, Building 113, DK-2800 Kgs. Lyngby, Denmark

¹ioanf@env.dtu.dk tel. +45 45251418, ²dbka@env.dtu.dk tel. +45 45251446,

³s101115@student.dtu.dk tel. +4551797938, ⁴iria@env.dtu.dk, tel. +45 45251429

Ammonia is the major toxicant in full scale anaerobic digesters of animal wastes which are rich in proteins and/or urea, such as pig or poultry wastes. Ammonia inhibition decreases methane production rates, increases volatile fatty acids concentration and leads to economic losses for the biogas plants. The methods used today to counteract ammonia inhibition are slow and cost-expensive. A new biological approach to avoid or counteract ammonia inhibition by using ammonia tolerant methanogens, could provide a sustainable solution for cost-effective digestion of abundant ammonia-rich wastes. The aim of the current study was to isolate and identify methanogenic cultures tolerant to high ammonia concentrations. A mixed methanogenic population was stepwise exposed to ammonia concentrations (1 to 9.26 g NH₄⁺-N L⁻¹) during an enrichment process with successive batch cultivations. The methanogenic population was derived from a full scale biogas reactor (Hashøj, Denmark), fed with 75% animal manure and 25% food industries organic waste. Basal anaerobic medium was used for the enrichment along with sodium acetate (1 g HAc L⁻¹) as a carbon source. Fluorescence *in-situ* hybridization (FISH) was used to determine microbial community composition. The outcome of the enrichment process was a mesophilic aceticlastic methanogenic enriched culture able to withstand high ammonia loads and utilize acetate and form methane stoichiometrically. FISH analysis showed that the methanogens of the enriched culture belonged exclusively to strict aceticlastic methanogens. Results obtained in this study, demonstrated for the first time that strictly aceticlastic methanogens, derived from an enriched culture, can efficiently produce methane under high ammonia levels.